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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/963,790	09/27/2001	Mike Farwick	32301WD230	9133

7590 04/10/2007

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EXAMINER	
STEADMAN, DAVID J	
ART UNIT	PAPER NUMBER
1656	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/963,790	FARWICK ET AL.	
	Examiner	Art Unit	
	David J. Steadman	1656	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5,9,12,34,35,37,38,40,42,44,46,48 and 51-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5,9,12,34,35,37,38,44 and 51-54* is/are allowed.

6)☒ Claim(s) *40,42,46,48,55 and 56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☒ Other: *Appendices A and B*.

DETAILED ACTION

Status of the Application

[1] Claims 5, 9, 12, 34-35, 37-38, 40, 42, 44, 46, 48, and 51-56 are pending in the application.

[2] Applicant's amendment to the claims after final rejection, filed on 3/12/07, is acknowledged and has been entered into the application. This listing of the claims replaces all prior versions and listings of the claims in accordance with 37 CFR 1.121(c).

[3] Applicant's arguments filed on 3/12/07 in response to the Office action mailed on 12/11/06 have been fully considered and are deemed to be persuasive to overcome some of the rejections and/or objections previously applied. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn.

[4] The text of those sections of Title 35 U.S. Code not included in the instant action can be found in a prior Office action.

Claim Rejections - 35 USC § 112, Second Paragraph

[5] Claim(s) 55-56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 55 (claim 56 dependent therefrom) is drawn to a method for producing L-amino acids by cultivating the recited host cell and attenuating expression of the recited nucleic acids. However, the claim does not require that the recited host cells comprise

the recited *isolated* nucleic acids. As such, it is unclear as to whether or not the recited host cell comprises the recited *isolated* nucleic acids. It is suggested that applicant clarify the meaning of the claim.

Claim Rejections - 35 USC § 112, First Paragraph

[6] Claims 55-56 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This is a new matter rejection.

MPEP § 2163 states, "when filing an amendment an applicant should show support in the original disclosure for new or amended claims" and "[i]f the originally filed disclosure does not provide support for each claim limitation, or if an element which applicant describes as essential or critical is not claimed, a new or amended claim must be rejected under 35 U.S.C. 112, para. 1, as lacking adequate written description."

Claim 55 (claim 56 dependent therefrom) is drawn to (in relevant part) a method for the fermentative preparation of L-amino acids comprising the step of cultivating a recombinant *Escherichia coli* host cell. While the specification would appear to support an *Escherichia coli* host cell transformed with a vector comprising the recited nucleic acids (see, *e.g.,* paragraphs 29, 31, 62, 64, 85, and original claim 12). However, the examiner can find no support in the original application for the concept of using an *Escherichia coli* host cell for L-amino acid production.

Also, the method of claim 55 does not appear to be supported by the original disclosure. Examples 4 and 5 (beginning at p. 27 of the specification) provide support for a method for producing L-amino acids by culturing a *C. glutamicum* host cell, which has an attenuated endogenous deaD gene, wherein the gene is attenuated prior to culturing of the host cell. However, the method of claim 55 (claim 56 dependent therefrom) involves culturing of the recited host cell *followed by* attenuation of expression of an *isolated* nucleic acid, including fragments of SEQ ID NO:1. Because the recited nucleic acid of the host cell is *isolated*, this suggests that the host cell is transformed with the recited nucleic acid and then expression of the isolated nucleic acid is subsequently attenuated. Further, the claimed method encompasses attenuation of expression of fragments of SEQ ID NO:1. In this case, the original application does not appear to provide support for such a method. Applicant is invited to show support for claim 55 in the original application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[7] The indicated allowability of claims 40, 42, 46, and 48 is withdrawn in view of the newly discovered reference(s) to Pompejus et al. (US Patent Application Publication

2006/0269975). A rejection based on the newly cited reference follows. It is noted that this reference was only made publicly available after the sequence search conducted on 6/2/2006.

[8] Claim(s) 40, 42, 46, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pompejus et al. (US Patent Application Publication 2006/0269975), which claims priority under 35 U.S.C. 119(e) to US provisional application 60/144,448, filed on 7/16/99. The claims are drawn to an isolated polynucleotide consisting of a fragment of SEQ ID NO:1 or its complement, wherein the fragment consists of at least 30 or 40 consecutive nucleotides.

Pompejus et al. teaches a nucleic acid, SEQ ID NO:143, which comprises SEQ ID NO:1 herein with the exception of two mismatches at positions 273 and 479 of SEQ ID NO:1 (Appendix A). Pompejus et al. teaches oligonucleotide primers that are at least 40 consecutive nucleotides of SEQ ID NO:143 (p. 11, paragraph 73) for use in amplifying coding sequence and 3'-untranslated sequence downstream of SEQ ID NO:143 (p. 10, paragraphs 66-67 and p. 11, paragraph 73). Although Pompejus et al. suggests fragments of SEQ ID NO:143 that would be encompassed by claims 40, 42, 46, and 48 herein, the reference of Pompejus et al. does not specifically teach a polynucleotide consisting of at least 30 or 40 consecutive nucleotides of SEQ ID NO:1 herein.

It would have been obvious to one of ordinary skill in the art to make: 1) an antisense PCR primer that is at least 30 or 40 consecutive nucleotides and is complementary to the 3'-end of SEQ ID NO:1 with the primer's 5'-nucleotide being at

nucleotide 2130 of SEQ ID NO:1 herein and 2) a sense PCR primer that is at least 30 or 40 consecutive nucleotides and is identical to the 3'-end of SEQ ID NO:1 with the primer's 3'-nucleotide being at nucleotide 2130 of SEQ ID NO:1 herein (see diagram at p. 2 of Appendix A). One would have been motivated for an antisense PCR primer that is at least 30 or 40 consecutive nucleotides and is complementary to the 3'-end of SEQ ID NO:1 with the primer's 5'-nucleotide being at nucleotide 2130 of SEQ ID NO:1 herein in order to PCR amplify SEQ ID NO:143 as suggested by Pompejus et al. One would have been motivated to make a sense PCR primer that is at least 30 or 40 consecutive nucleotides and is identical to the 3'-end of SEQ ID NO:1 with the primer's 3'-nucleotide being at nucleotide 2130 of SEQ ID NO:1 herein in order to PCR amplify 3'-untranslated sequence downstream of SEQ ID NO:143 as suggested by Pompejus et al. One would have a reasonable expectation of success for making the primers noted above because of the results of Pompejus et al. Therefore, claims 40, 42, 46, and 48, drawn to nucleic acid fragments of SEQ ID NO:1 as noted above, would have been obvious to one of ordinary skill in the art at the time of the invention.

In order to clarify the record, it is noted the sequence of SEQ ID NO:143 of Pompejus et al. was first disclosed in US provisional application 60/144,448, filed on 7/16/99 (see Appendix B).

Conclusion

[9] Status of the claims:

Claims 5, 9, 12, 34-35, 37-38, 40, 42, 44, 46, 48, and 51-56 are pending.

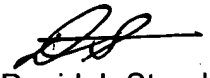
Claims 5, 9, 12, 34-35, 37-38, 44, and 51-54 appear to be in a condition for allowance.

Claims 40, 42, 46, 48, and 55-56 are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David J. Steadman whose telephone number is 571-272-0942. The examiner can normally be reached on Mon to Fri, 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kathleen Kerr Bragdon can be reached on 571-272-0931. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David J. Steadman, Ph.D.
Primary Examiner
Art Unit 1656

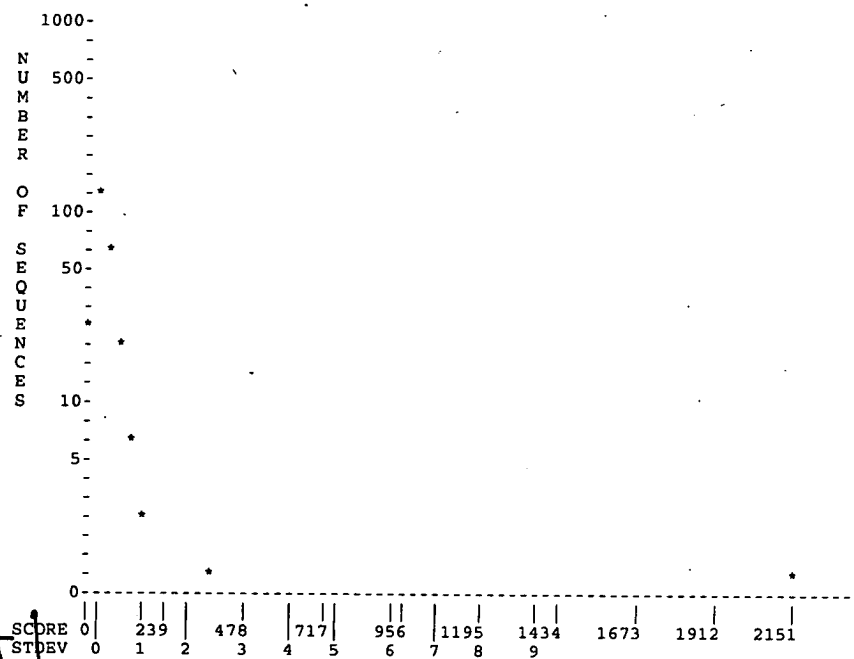
> O <
O| |O IntelliGenetics
> O <

FastDB - Fast Pairwise Comparison of Sequences
Release 5.4

Results file us-09-963-790a-1.res made by tport on Tue 27 Mar 107 15:02:26-PDT.

Query sequence being compared:US-09-963-790A-1 (1-2381)
Number of sequences searched: 217
Number of scores above cutoff: 217

Results of the initial comparison of US-09-963-790A-1 (1-2381) with:
File : US11370121.seq



PARAMETERS

Similarity matrix	Unitary	K-tuple	4
Mismatch penalty	1	Joining penalty	30
Gap penalty	5.00	Window size	500
Gap size penalty	0.33		
Cutoff score	1		
Randomization group	0		

SEARCH STATISTICS

	Mean	Median	Standard Deviation
Scores:	74	58	146.44

	CPU	Total Elapsed
Times:	00:00:00.02	00:00:00.00

Number of residues: 245221
Number of sequences searched: 217
Number of scores above cutoff: 217

APPENDIX A

The scores below are sorted by initial score.
Significance is calculated based on initial score.

A 100% identical sequence to the query sequence was not found.

The list of best scores is:

Sequence Name	Description	Length	Init. Score	Opt. Score	Sig.	Frame
**** 14 standard deviations above mean ****						
1. US-11-370-121-14 Sequence 143, Application		2319	2151	2151	14.18	0

1. US-09-963-790A-1 (1-2381)
US-11-370-121-14 Sequence 143, Application US/11370121

Initial Score	= 2151	Optimized Score	= 2151	Significance	= 14.18
Residue Identity	= 99%	Matches	= 2151	Mismatches	= 2
Gaps	= 0	Conservative Substitutions			= 0

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                                                                X       10        20
                                                                CAGGAAACCCCGCAGGGTGACT
                                                                |||||||||||||||||||||
    ACGTCAACGGCGACGTAGAACAGCCGAATAACGTCATTTCGTCGGAATCTCAGGAAACCCCGCAGGGTGACT
     120       130       140       150       160       170       180

          30        40        50        60        70        80        90
    CAGCATCAGCTGACTTCGCTCTCGAAACCCCAACCAACACTGTTGAAGATGCACCAGCATCTGAGGGTAGCG
    |||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
    CAGCATCAGCTGACTTCGCTCTCGAAACCCCAACCAACACTGTTGAAGATGCACCAGCATCTGAGGGTAGCG
  190       200       210       220       230       240       250       260

       100       110       120       130       140       150       160
    AAGAGATCACCAGGGTTGCGGATACTTCTGAGGACGCCGACTCTGCAGATGCAGACAACGCGAGCAATGTAA
    |||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
    AAGAGATCACCAGGGTTGCGGATACTTCTGAGGACGCCGACTCTGCAGATGCAGACAACGCGAGCAATGTAA
           270       280       290       300       310       320       330

     170       180       190       200       210       220       230
    TCAATGAGAATGAGGACTCCTCGGAAGGTGCTAACCAGCCTTCAAACGAGTCATCCTCTACGGAAGCCAAAT
    |||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
    TCAATGAGAATGAGGACTCCTCGGAAGGTGCTAACCAGCCTTCAAACGAGTCATCCTCTACGGAAGCCAAAT
          340       350       360       370       380       390       400

  240       250       260       270       280       290       300       310
    CCGGCTTCGATGCACTCGGACTGCCAGAGCGTGTACTTGACGCTGTGCGCAAGGTGGGTTACGAAACTCCTT
    |||||||||||||||||||||||||||||||| ||||||||||||||||||||||||||||||||||||||
    CCGGCTTCGATGCACTCGGACTGCCAGAGCGTGTTCTTGACGCTGTGCGCAAGGTGGGTTACGAAACTCCTT
       410       420       430       440       450       460       470

            320       330       340       350       360       370       380
    CCCCAATTCAGGCACAAACCATCCCAATCCTCATGGAGGGCCAGGATGTTGTTGGTCTAGCACAGACCGGTA
    |||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
    CCCCAATTCAGGCACAAACCATCCCAATCCTCATGGAGGGCCAGGATGTTGTTGGTCTAGCACAGACCGGTA
     480       490       500       510       520       530       540

         390       400       410       420       430       440       450
    CCGGTAAGACTGCAGCTTTCGCGCTGCCAATCCTTGCCCGTATTGACAAGTCCGTGCGCAGCCCACAGGCAC
    |||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
    CCGGTAAGACTGCAGCTTTCGCGCTGCCAATCCTTGCCCGTATTGACAAGTCCGTGCGCAGCCCACAGGCAC
  550       560       570       580       590       600       610       620

       460       470       480       490       500       510       520
    TTGTGCTTGCCCCTACCCGTGAGCAGGCACTTCAGGTTGCTGACTCCTTCCAATCCTTCGCTGACCACGTCG
    |||||||||||||||||||| ||||||||||||||||||||||||||||||||||||||||||||||||||
    TTGTGCTTGCCCCTACCCGTGAGCTGGCACTTCAGGTTGCTGACTCCTTCCAATCCTTCGCTGACCACGTCG
           630       640       650       660       670       680       690

     530       540       550       560       570       580       590
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GTGGCCTGAACGTTCTGCCAATCTATGGTGGACAGGCTTACGGCATTCAGCTCTCTGGCCTGCGTCGTGGCG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
GTGGCCTGAACGTTCTGCCAATCTATGGTGGACAGGCTTACGGCATTCAGCTCTCTGGCCTGCGTCGTGGCG
      700       710       720       730       740       750       760

600       610       620       630       640       650       660       670
CTCACATCGTCGTGGGTACCCCAGGCCGAATCATCGATCACCTCGAAAAGGGCTCCCTGGATATCTCCGGAC
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
CTCACATCGTCGTGGGTACCCCAGGCCGAATCATCGATCACCTCGAAAAGGGCTCCCTGGATATCTCCGGAC
   770       780       790       800       810       820       830

         680       690       700       710       720       730       740
TGCGCTTCCTCGTGCTCGATGAAGCAGACGAGATGCTGAACATGGGCTTCCAGGAAGATGTCGAGCGCATCC
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
TGCGCTTCCTCGTGCTCGATGAAGCAGACGAGATGCTGAACATGGGCTTCCAGGAAGATGTCGAGCGCATCC
 840       850       860       870       880       890       900

      750       760       770       780       790       800       810
TCGAGGACACCCCAGACGAGAAGCAGGTTGCACTATTCTCCGCAACGATGCCAAACGGCATTCGTCGCCTGT
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
TCGAGGACACCCCAGACGAGAAGCAGGTTGCACTATTCTCCGCAACGATGCCAAACGGCATTCGTCGCCTGT
910       920       930       940       950       960       970       980

    820       830       840       850       860       870       880
CCAAGCAGTACCTGAACAACCCTGCTGAAATCACCGTTAAGTCCGAGACCAGGACTAACACCAACATCACCC
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
CCAAGCAGTACCTGAACAACCCTGCTGAAATCACCGTTAAGTCCGAGACCAGGACTAACACCAACATCACCC
        990       1000      1010      1020      1030      1040      1050

  890       900       910       920       930       940       950
AGCGCTTCCTCAACGTTGCACACCGCAACAAGATGGATGCACTGACCCGTATTCTCGAGGTCACCGAGTTTG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
AGCGCTTCCTCAACGTTGCACACCGCAACAAGATGGATGCACTGACCCGTATTCTCGAGGTCACCGAGTTTG
     1060      1070      1080      1090      1100      1110      1120

960       970       980       990       1000      1010      1020      1030
AAGCAATGATCATGTTCGTGCGCACCAAGCACGAAACTGAAGAAGTTGCTGAAAAGCTCCGTGCACGCGGAT
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
AAGCAATGATCATGTTCGTGCGCACCAAGCACGAAACTGAAGAAGTTGCTGAAAAGCTCCGTGCACGCGGAT
  1130      1140      1150      1160      1170      1180      1190

       1040      1050      1060      1070      1080      1090      1100
TCTCCGCAGCAGCCATCAACGGCGACATTGCTCAGGCACAGCGTGAGCGCACCGTCGACCAGCTGAAGGACG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
TCTCCGCAGCAGCCATCAACGGCGACATTGCTCAGGCACAGCGTGAGCGCACCGTCGACCAGCTGAAGGACG
1200      1210      1220      1230      1240      1250      1260

    1110      1120      1130      1140      1150      1160      1170
GCCGCCTGGACATCCTCGTTGCAACCGACGTTGCAGCCCGTGGTCTTGACGTTGAGCGCATCTCCCACGTGC
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
GCCGCCTGGACATCCTCGTTGCAACCGACGTTGCAGCCCGTGGTCTTGACGTTGAGCGCATCTCCCACGTGC
1270      1280      1290      1300      1310      1320      1330      1340

  1180      1190      1200      1210      1220      1230      1240
TTAACTTCGACATTCCAAACGACACCGAGTCCTACGTTCACCGCATCGGCCGCACCGGCCGTGCAGGACGTA
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
TTAACTTCGACATTCCAAACGACACCGAGTCCTACGTTCACCGCATCGGCCGCACCGGCCGTGCAGGACGTA
      1350      1360      1370      1380      1390      1400      1410

1250      1260      1270      1280      1290      1300      1310
CCGGCGAGGCAATCCTGTTCGTGACCCCACGTGAGCGTCGTATGCTTCGCTCCATCGAGCGCGCAACCAACG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
CCGGCGAGGCAATCCTGTTCGTGACCCCACGTGAGCGTCGTATGCTTCGCTCCATCGAGCGCGCAACCAACG
    1420      1430      1440      1450      1460      1470      1480

1320      1330      1340      1350      1360      1370      1380      1390
CACCACTGCACGAAATGGAACTGCCAACCGTCGATCAGGTCAACGACTTCCGCAAGGTCAAGTTCGCTGACT
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
CACCACTGCACGAAATGGAACTGCCAACCGTCGATCAGGTCAACGACTTCCGCAAGGTCAAGTTCGCTGACT
  1490      1500      1510      1520      1530      1540      1550

      1400      1410      1420      1430      1440      1450      1460
CCATCACCAAGTCCCTCGAGGACAAGCAGATGGACCTGTTCCGCACCCTGGTCAAGGAATACTCCCAGGCCA
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||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
CCATCACCAAGTCCCTCGAGGACAAGCAGATGGACCTGTTCCGCACCCTGGTCAAGGAAATACTCCCAGGCCA
1560      1570      1580      1590      1600      1610      1620

    1470      1480      1490      1500      1510      1520      1530
ACGACGTTCCTCTAGAGGACATCGCAGCGGCACTGGCAACCCAGGCACAGTCCGGCGACTTCCTGCTCAAGG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
ACGACGTTCCTCTAGAGGACATCGCAGCGGCACTGGCAACCCAGGCACAGTCCGGCGACTTCCTGCTCAAGG
1630      1640      1650      1660      1670      1680      1690      1700

  1540      1550      1560      1570      1580      1590      1600
AGCTCCCACCAGAGCGCCGTGAGCGCAACGACCGCCGTCGTGACCGTGACTTCGACGACCGTGGTGGACGTG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
AGCTCCCACCAGAGCGCCGTGAGCGCAACGACCGCCGTCGTGACCGTGACTTCGACGACCGTGGTGGACGTG
      1710      1720      1730      1740      1750      1760      1770

1610      1620      1630      1640      1650      1660      1670
GACGCGACCGTGACCGTGGCGACCGCGGAGATCGTGGCTCACGCTTCGACCGCGACGACGAGAACCTGGCAA
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
GACGCGACCGTGACCGTGGCGACCGCGGAGATCGTGGCTCACGCTTCGACCGCGACGACGAGAACCTGGCAA
    1780      1790      1800      1810      1820      1830      1840

1680      1690      1700      1710      1720      1730      1740      1750
CCTACCGCCTCGCAGTGGGCAAGCGCCAGCACATCCGCCCAGGCGCAATCGTTGGTGCACTTGCCAACGAAG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
CCTACCGCCTCGCAGTGGGCAAGCGCCAGCACATCCGCCCAGGCGCAATCGTTGGTGCACTTGCCAACGAAG
  1850      1860      1870      1880      1890      1900      1910

       1760      1770      1780      1790      1800      1810      1820
GTGGCCTGAACTCCAAGGACTTCGGCCGCATCACCATCGCAGCCGACCACACCCTGGTTGAACTGCCAAAGG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
GTGGCCTGAACTCCAAGGACTTCGGCCGCATCACCATCGCAGCCGACCACACCCTGGTTGAACTGCCAAAGG
1920      1930      1940      1950      1960      1970      1980

    1830      1840      1850      1860      1870      1880      1890
ATCTCCCACAGAGCGTTCTTGACAACCTGCGCGACACCCGCATCTCCGGCCAGCTCATCAACATAGAACGCG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
ATCTCCCACAGAGCGTTCTTGACAACCTGCGCGACACCCGCATCTCCGGCCAGCTCATCAACATAGAACGCG
1990      2000      2010      2020      2030      2040      2050      2060

  1900      1910      1920      1930      1940      1950      1960
ACTCCGGTGGACGCCCACCACGCCGCTTCGAGCGCGATGACCGTGGCGGACGCGGCGGATTCCGCGGCGACC
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
ACTCCGGTGGACGCCCACCACGCCGCTTCGAGCGCGATGACCGTGGCGGACGCGGCGGATTCCGCGGCGACC
      2070      2080      2090      2100      2110      2120      2130

1970      1980      1990      2000      2010      2020      2030
GTGATGACCGCGGTGGACGTGGACGTGACCGTGACGATCGTGGAAGCCGTGGAGGTTTCCGCGGTGGACGTG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
GTGATGACCGCGGTGGACGTGGACGTGACCGTGACGATCGTGGAAGCCGTGGAGGTTTCCGCGGTGGACGTG
    2140      2150      2160      2170      2180      2190      2200

2040      2050      2060      2070      2080      2090      2100      2110
ACCGTGATGATCGTGGCGGACGCGGTGGATTCCGCGGACGCGACGACCGCGGAGACCGTGGTGGCCGTGGCG
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
ACCGTGATGATCGTGGCGGACGCGGTGGATTCCGCGGACGCGACGACCGCGGAGACCGTGGTGGCCGTGGCG
  2210      2220      2230      2240      2250      2260      2270

      2120      2130      2140      2150  X   2160      2170      2180
GTTACCGTGGCGGACGCGACTAAGAGTTCGTTTTAGCTTCAGCTCAGGTTTTCGCCTGAGTCTGGTGCTTAG
||||||||||||||||||||||||||||||||||||||
GTTACCGTGGCGGACGCGACTAAGAGTTCGTTTTAGCTTCAGC
2280      2290      2300      2310      X

    2190      2200
CTAGAAAAATCCGTTGCTCTC
```

Coding Sequence

untranslated sequence

APPENDIX B

~~APPENDIX A~~: DNA SEQUENCES

>RXA00045-upstream
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TGTTGATGAATTCCTGTACACCGCTTAAGGCCCACACCTC

>RXA00045
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CTAGTCCCCGATAACACCCCGACGACAACATTGTCCACGGGACGCTTGGGAACAAAAGAA
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GAACACGGTCTCAGTGTCGCCCGCATCGGCATGGGCGCTCCTGGTGTAATTCTGGGACCA
GAGGGAACCATCGTGTACAACGGTGAAACCCTCACAGAGTGGGCAGGCACTGACCTGCGA
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CGGTGCGAAAATGTAGCAAGTGGCACCGGCCTAACCAGGTACTACAACGAGGCCGCCGCA
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CTGGACCTTTCCGCAGTAGTAGTTGGAGGCGGAGTCGCAGGCATCGGCGCACCCGTCATG
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>RXA00050-upstream
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>RXA00050
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ACCAACACTGTTGAAGATGCACCAGCATCTGAGGGTAGCGAAGAGATCACCAGGGTTGCG
GATACTTCTGAGGACGCCGACTCTGCAGATGCAGACAACGCGAGCAATGTAATCAATGAG
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GATGTTGTTGGTCTAGCACAGACCGGTACCGGTAAGACTGCAGCTTTCGCGCTGCCAATC
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CTGGATATCTCCGGACTGCGCTTCCTCGTGCTCGATGAAGCAGACGAGATGCTGAACATG
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CTATTCTCCGCAACGATGCCAAACGGCATTCGTCGCCTGTCCAAGCAGTACCTGAACAAC
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CTGGCAACCCAGGCACAGTCCGGCGACTTCCTGCTCAAGGAGCTCCCACCAGAGCGCCGT
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CGCGGTGGACGTGGACGTGACCGTGACGATCGTGGAAGCCGTGGAGGTTTCCGCGGTGGA
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>RXA00157
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GCGGAAGCGGAAGCTCAGGCTGCTGCGGAGGAGAAGCGTCGTGCCGATGAGGCTGCTGCA
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ATT

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>RXA00060-upstream
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>RXA00060
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GCTGCCCCCGTGGAGGAAGTGGAAGCGGAACAGGTTGTCGTCGATACGCAATCTTTGGCG
CAATGGCTGCCTGCTAGGGCTGGCCAGGCGCTTGCTTTAGCGCTGGCTGGAGTGGCTAAA

APPENDIX B: AMINO ACID SEQUENCES

> RXA00045 (1-909, translated) 303 residues
PTCTLAL DIGATKIAYA LVPDNTPTTT LSTGRLGTKE GDSPIEQIRL VLLAGLKAAE
EHGLSVARIG MGAPGVILGP EGTIVYNGET LTEWAGTDLR GLSREVLNVP FAAHNDVRVW
AYGEHHLGTG KDLTGRVLYV SLGTGVGGAI IEDGIMMSSP TGTAGEFAEV VCSDHAGLAV
RCENVASGTG LTRYYNEAAA TQLDLPAIME RFHQGDGLAQ QIITGNLRGF GQALGALVTV
LDLSAVVVGG GVAGIGAPVM DPITAGIFDR VLTPNKSVQV LSTSLGAQAA VIAAAKYARD
NAP

> RXA00050 (1-2196, translated) 732 residues
MSNTENVNGD VEQPNNVISS ESQETPQGDS ASADFALETP TNTVEDAPAS EGSEEITRVA
DTSEDADSAD ADNASNVINE NEDSSEGANQ PSNESSSTEA KSGFDALGLP ERVLDAVRKV
GYETPSPIQA QTIPILMEGQ DVVGLAQTGT GKTAAFALPI LARIDKSVRS PQALVLAPTR
ELALQVADSF QSFADHVGGL NVLPIYGGQA YGIQLSGLRR GAHIVVGTPG RIIDHLEKGS
LDISGLRFLV LDEADEMLNM GFQEDVERIL EDTPDEKQVA LFSATMPNGI RRLSKQYLNN
PAEITVKSET RTNTNITQRF LNVAHRNKMD ALTRILEVTE FEAMIMFVRT KHETEEVAEK
LRARGFSAAA INGDIAQAQR ERTVDQLKDG RLDILVATDV AARGLDVERI SHVLNFDIPN
DTESYVHRIG RTGRAGRTGE AILFVTPRER RMLRSIERAT NAPLHEMELP TVDQVNDFRK
VKFADSITKS LEDKQMDLFR TLVKEYSQAN DVPLEDIAAA LATQAQSGDF LLKELPPERR
ERNDRRRDRD FDDRGGRGRD RDRGDRGDRG SRFDRDDENL ATYRLAVGKR QHIRPGAIVG
ALANEGGLNS KDFGRITIAA DHTLVELPKD LPQSVLDNLR DTRISGQLIN IERDSGGRPP
RRFERDDRGG RGGFRGDRDD RGGRGRDRDD RGSRGGFRGG RDRDDRGGRG GFRGRDDRGD
RGGRGGYRGG RD

> RXA00060 (1-2457, translated) 819 residues
VTEKTDQTLM LIDGHSMAFR AFFALPAENF STSGGQATNA VYGFLSMLST LLKDEQPTHV
AVAFDVGRKT FRTDMFPAYK AQREATPPEF KGQVEILKEV LSTLGITTIE KIDFEADDVI
ATLSVAAKPL GEKTLIVTGD RDSFQLVNDT TTVLYPMKGV SVLHRFTPEA VEEKYGLTPR
QYPEFAALRG DPSDNLPNIP GVGEKTATKW IAQYETLDNL LDHADEIKGK VGASLRERIE
QVRMNRKLTE MVKDLELPLG PDDFEMKPVQ VAEVAAKFDD LEFGTNLRER VLAVVKAEGS
AAPVEEVEAE QVVVDTQSLA QWLPARAGQA LALALAGVAK PAAGDTYALA IADTKRHAVL
VDVADISAED EKALATWLAS EDPKMLHGAK AAYHMLAGRG FELHGVVHDT AIAAYLLRPG
QRTYELADVY QRHLQRQLST NDNGGQLTLL DAADDQSLVD DVIAILELSE ELTKQLQEIQ
AFELYHDLEI PLSGILARME AIGIAVDVAT LEEQLKTFIG QVAQEEEAAR ELAEDPTLNL
SSPKQLQVVL FETFGMPKTK KTKTGYSTAA AEILEALAIKN PHPFLDHLLA HRQYQKMKTT
LEGLIREVAP DGRIHTTFNQ TVASTGRLSS TDPNLQNIPV RTEAGRKIRS GFVVGEGYET
LLTADYSQIE MRVMAHLSQD PGLIEAYREG EDLHNYVGSK VFNVPIDGVT PELRRQVKAM
SYGLVYGLSA FGLSQQLSIP AGEAKQIMES YFERFGGVQR YLREIVEEAR KAGYTETLFG
RRRYLPELTS DNRVARENAE RAALNAPIRE LPQTSSRWP

> RXA00061 (1-210, translated) 70 residues
MIRVDRSLKE AAVKSRVLLQ VHDELVVEVA AGELEQVREI LEREMDNAIK LSVPLEVSAG
DGVNWDAAAH

> RXA00066 (1-813, translated) 271 residues
VTDPLSAALD SGRINHAYLF SGPRGCGKTS SARILARSLN CVEGPTSTPC GVCNSCVALA
PGGPGTLDVT ELDAASNNGV DDMRELRERA NYAPAESRYR VFIIDEAHMI STQGFNALLK
IVEEPPAHLI FIFATTEPDK MIGTIRSRTH NYPFRLLTPG DMRKVLKNAV DGEGVHVDDS
VYPLVIRAGG GSPRDSLSIL DQLIAGSGPE GLTYERALPL LGVTSFTLID DSIHALASKD
NASMFTTIDN VIEEGLEPRR FTIDLPSDPL R

> RXA00095 (1-2289, translated) 763 residues
MNTSPFTPGS PDLIDGLNEQ QRAAVEHIGS PLLIVAGAGS GKTAVLTRRI AYLMRYRGVH
PQQILAITFT NKAAAEMRER VSQLVGPVAE RMWVATFHSV CVRILRQQAQ LVEGLNTNFT
IYDSDDSRRL LTMIAKDLEL DIKKFSARTL LGAISNLKNE LVTPQEALAD AERTHNPYET
VVARAFSEYQ SRLRRANAVD FDDLIGETVR IFREHPPVAE YYRRRFRHVL IDEYQDTNHA
QYELISTLVG KPDQDPSELC VVGDSDQSIY AFRGATIRNI EEFERDFSNA RTILLEQNYR
STQTILSAAN AVISQNENRR PKNLWTALGE GEQIIGYVAD NEHDEARFIA SEIDNLVDHG
MSYSDIAIMY RTNNSSRALE DVFMRTGVPY KVVGGTKFYE RKEIRDIIAY LRVLENPDDT
VNLRRIINTP KRGIGDRAQA FIALHSENNQ ISFGQALLDA ALGKVDLLGA RGKNAAIKFN